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(54) **ZIP SLIDER**

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CPC ***A44B 19/308*** (2013.01); ***A44B 19/262*** (2013.01); ***A44B 19/306*** (2013.01)

(58) **Field of Classification Search**
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,102,022 A * 7/1978 Aoki A44B 19/308 24/421
4,391,022 A * 7/1983 Oda A44B 19/306 24/421
4,422,220 A * 12/1983 Oda A44B 19/306 24/421
4,768,263 A * 9/1988 Fukuroi A44B 19/306 24/418
(Continued)

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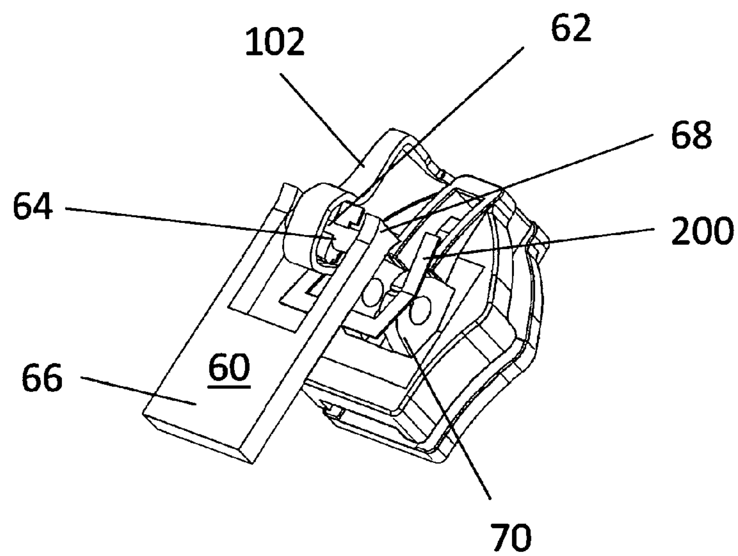
(57) **ABSTRACT**

A zip slider has: a slider body having upper and lower elements providing two entry channels through which zip teeth pass and slider un/mating; a pull tab having a cam; a biasing spring having a locking prong and a follower surface bearing against the cam. The cam on the follower surface biases the tab into a closed position in which it lies against the upper element. When the tab is in a lifted position, the cam action on the follower surface raises the prong above the mated teeth, enabling relative motion of the teeth and body; when the tab is in the closed position, the prong bears against the teeth to prevent unwanted relative slider and teeth motion. The slider has a counter bias, acting between the upper element and the tab to apply a biasing force on the tab acting against the action of the cam and follower surface.

7 Claims, 4 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

5,031,286	A *	7/1991	Kedzierski	A44B 19/26	24/421
5,152,036	A *	10/1992	Oda	A44B 19/308	24/421
5,528,802	A *	6/1996	Akashi	A44B 19/303	24/418
5,544,394	A *	8/1996	Yaguramaki	A44B 19/308	24/424
5,809,622	A *	9/1998	Yaguramaki	A44B 19/308	24/419
5,896,628	A *	4/1999	Oda	A44B 19/306	24/421
6,497,016	B1 *	12/2002	Lin	A44B 19/308	24/418
6,510,594	B2 *	1/2003	Lin	A44B 19/308	24/419
6,588,072	B1 *	7/2003	Lin	A44B 19/265	24/416
6,591,464	B2 *	7/2003	Lin	A44B 19/308	24/419
6,637,078	B2 *	10/2003	Nagata	A44B 19/306	24/419
7,257,869	B2 *	8/2007	Lin	A44B 19/262	24/421
8,567,019	B2 *	10/2013	Yamamoto	A44B 19/306	24/419
2002/0000025	A1 *	1/2002	Yamagishi	A44B 19/306	24/421
2002/0152591	A1 *	10/2002	Nagata	A41F 1/002	24/303
2005/0125967	A1 *	6/2005	Yamagishi	A44B 19/306	24/420

* cited by examiner

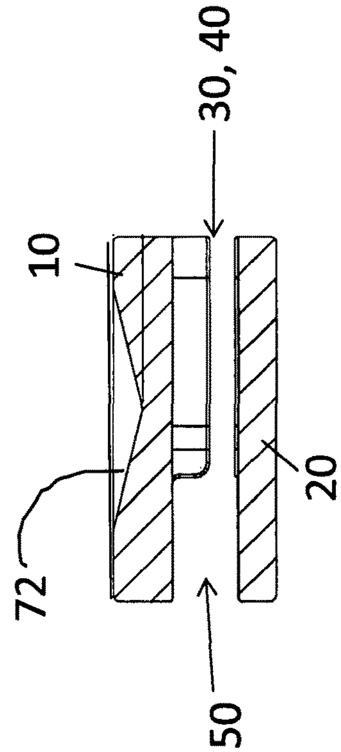


Fig. 2

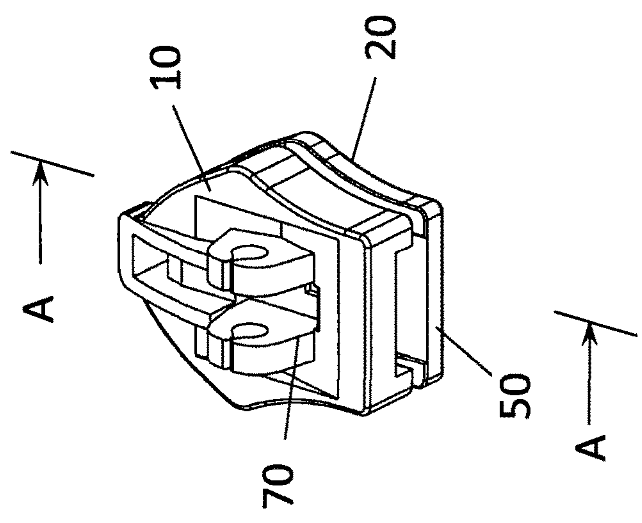


Fig. 1

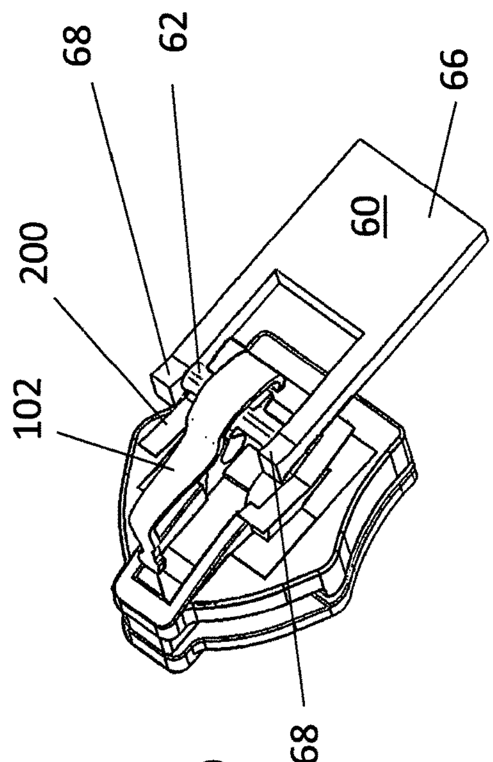


Fig. 4

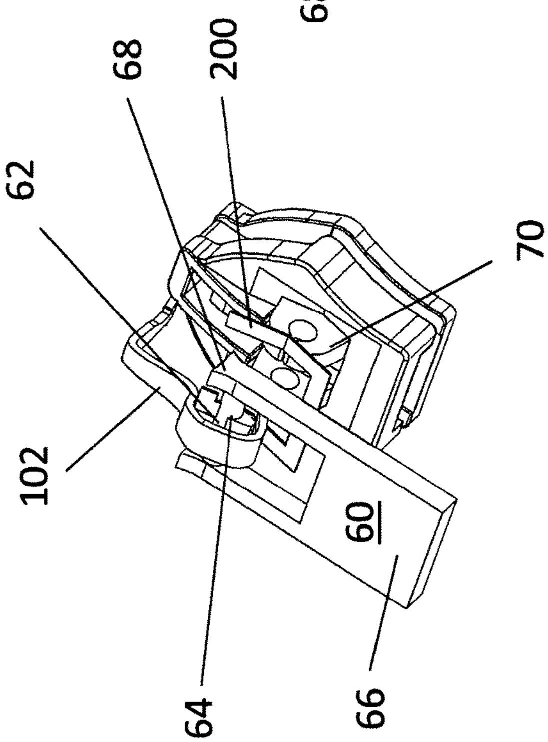


Fig. 3

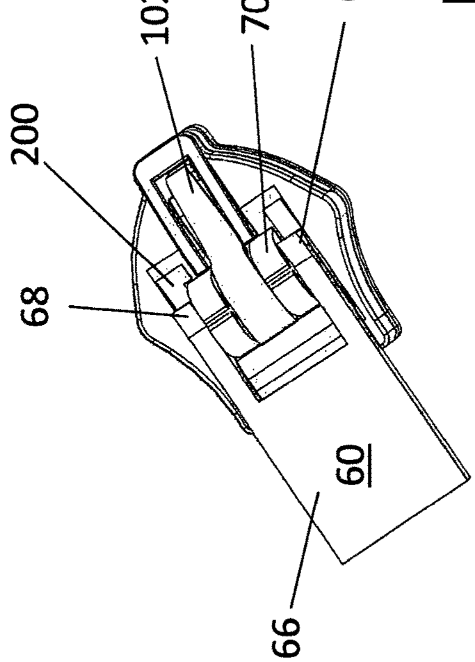


Fig. 5

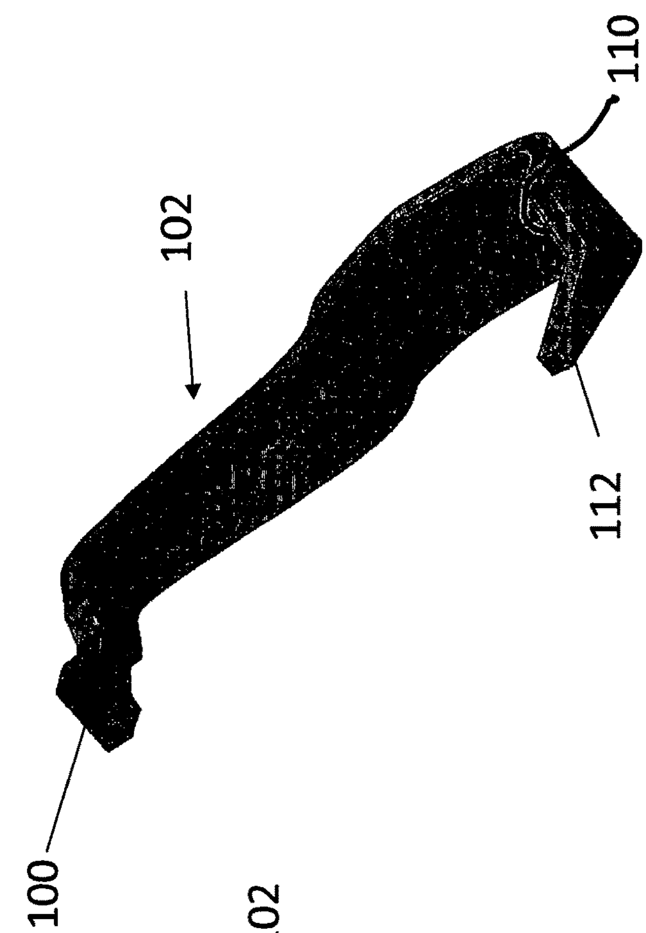


Fig. 7

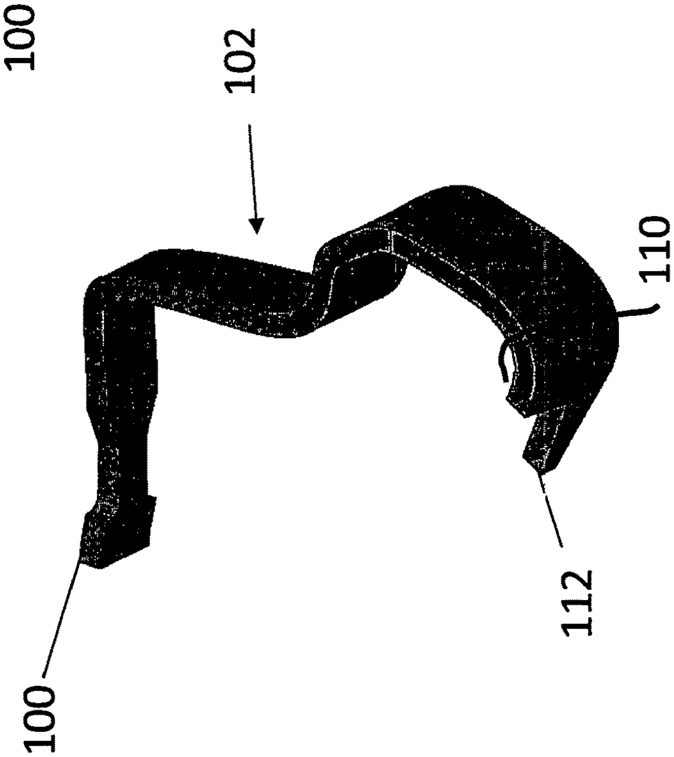


Fig. 6

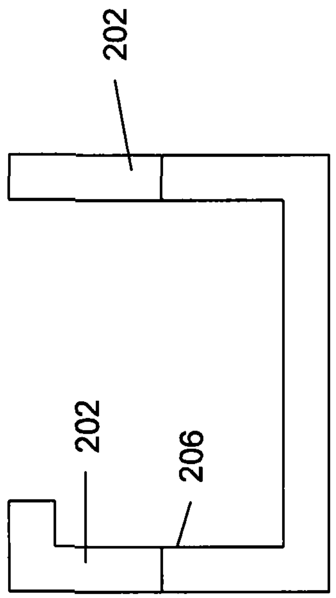


Fig. 9

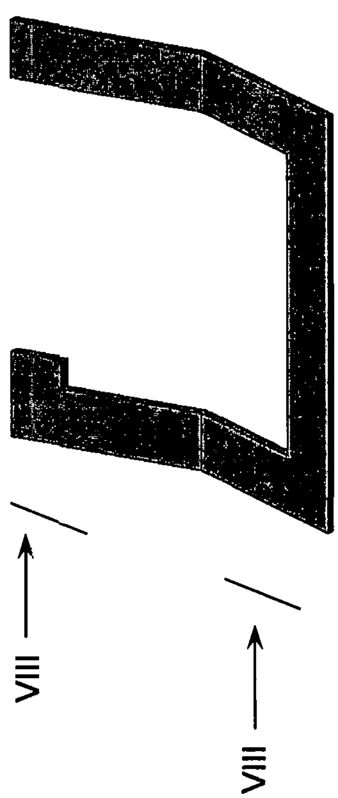


Fig. 8

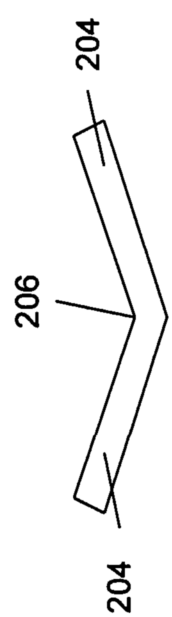


Fig. 10

ZIP SLIDER

BACKGROUND TO THE INVENTION

1. Field of the Invention

The present invention relates to a slider for a zip fastener and, more particularly, to a zip slider incorporating a mechanism to retain a pull tab in a closed position which then prevents vibration of the pull tab relative to the slider body.

2. Description of Related Art

Anti-vibration zip sliders are known per se. Typically, such a slider will have a body comprising upper and lower interconnected elements which cooperate to provide the entry channels via which, during relative motion of the zip tape and slider, the zip teeth are fed into or out of a single, central channel where the zip teeth knit or unknit during fastening or unfastening of the zip. Typically, the slider will additionally comprise a spring-loaded locking prong mounted on the slider body, which projects into the central channel. The locking prong is typically formed from a leaf spring material and, in use, bears against the knitted zip teeth thereby to prevent unwanted movement of the slider. A pull tab, pivotally mounted on the body is the means by which a user moves the slider. The pull tab has a cam formed at pivoting axis which, typically, cooperates with a follower surface provided on the same leaf spring element from which the locking prong is formed. When the pull tab **60** lies flat against the upper element of the slider body in a 'closed' or 'resting' position, the follower surface of the leaf spring acts on the cam to provide a resting bias and to bias the pull tab **60** into the resting position; and the locking prong—formed at the other end of the same leaf spring element—is allowed project fully into the channel and to bear against the zip teeth to lock the position of the zip slider. Conversely, when the pull tab is pivoted out of the resting position, to a position in which it is pivoted away from the body to enable a user to hold it, the cam acts on the follower surface of the leaf spring element to cause the locking prong to lift from the zip teeth, thereby unlocking the zip slider and enabling relative motion of the slider and teeth. In this way, a zip slider can be provided which has locking capability and, at the same time, when locked, whose pull tab is retained in a closed position without the possibility of vibration against the slider body.

Most usually, when the zip slider is in the locked position the locking prong will bear on the zip teeth in a ridge created between two adjacent teeth. In such a position, the locking prong will adopt its position of greatest displacement into the channel. That, in turn, means that the force applied on the cam of the pull tab by the follower surface to bias the pull tab into the resting position will then be at its greatest. Occasionally, however, the relative displacement of the zip slider and zip teeth is such that the locking prong will bear upon the top of a single zip tooth. The consequence of this is that the follower surface then bears less strongly against the cam and so applies a lesser biasing force with the result that the pull tab may then either move a little from the resting position or move a little more easily from that position. Either outcome can give rise to vibration and possibly noise. This is undesirable.

SUMMARY OF THE INVENTION

The present invention provides a zip slider which ameliorates the above mentioned problems.

According to a first aspect of the present invention there is provided a zip slider comprising a body movable along

opposing pairs of zip teeth to cause inter and extradigitation of the zip teeth; a pull tab pivotally mounted to the body and having a resting position in which it lies against the body and a pulling position in which it is pivoted from the resting position; a locking prong which is engaged with interdigitated teeth to prevent relative motion of the slider and teeth when the pull tab is in the resting position, and disengaged to permit the relative motion when in the pulling position; a damping bias acting to apply a damping bias to the pull tab relative to the body when in the resting position.

BRIEF DESCRIPTION OF DRAWINGS

Embodiments of the invention will now be described, by way of example, in which:

FIG. **1** is a perspective view of a zip slider body according to an embodiment of the present invention;

FIG. **2** is a section on A-A in FIG. **1**;

FIG. **3** is a perspective view of a zip slider with a pull tab in a resting position;

FIGS. **4** to **5** are perspective views of an assembled zip slider according to an embodiment of the present invention;

FIGS. **6** and **7** are perspective views of a leaf spring providing locking prong and cam follower surface;

FIG. **8** is a perspective view of the counter bias spring;

FIG. **9** is a plan view of the spring of FIG. **8**; and

FIG. **10** is a side view of the spring of FIGS. **8** and **9**.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIGS. **1** to **5** a zip slider has a body comprising upper and lower interconnected elements **10**, **20** which cooperate to form a pair of front channels **30**, **40**. Forward motion of the slider causes zip teeth (not shown) to pass into the front channels **30**, **40** and through a single, central, rear channel **50** resulting in interdigitation of the zip teeth and thus fastening of the zip. Backwards motion reverses the process, causing extradigitation. and thus unfastening.

The slider body may be moved by means of a pull tab, **60**, which is pivotally mounted on the upper element by means of the journaling of a cross shaft **62** at the base of the tab **60** within two bushes **70** integrated in the upper surface of the upper element **10** of the body.

Referring particularly now to FIGS. **6** and **7**, the slider comprises a spring-loaded locking prong **100**, which is located at one end of a formed, elongate leaf spring **102**. The other end of the leaf spring comprises a follower surface **110**, here provided by the internal surface of the end of the leaf spring **102** formed in the shape of a hook **112**. When assembled, the hook **112** extends around the cross shaft **62**, so that retention of the pull tab by location of the cross shaft **62** in the bushes **70** also then serves, by means of the hook being caught around the cross shaft **62**, to retain the leaf spring **102** against the slider body in a position such that the locking prong **100** projects into the central channel via an aperture **12** in the upper element **10** of the body. Further, the most distal part **114** of the hook which is trapped under the cross shaft **62** then provides a fulcrum about which the locking prong **100** may pivot when the hook is opened out. Opening of the hook **112** and consequent pivoting of the locking prong about the fulcrum point will now be described.

The cross shaft **62** of the pull tab **60** supports a cam **64**. The cam **64** and follower surface **110** provided by the inner surface of the hook **112** are both configured such that, when pull tab **60** is in the resting position illustrated in FIG. **3**, i.e. where the nib **66** of the tab **60** lies flat and rear-facing against the upper element **10** of the body, the configuration of the hook **112** causes the follower surface **110** to apply a force to the cam **64**. That force which urges the nib of the pull tab **60** against the upper element **10** and thus provides a resting bias which retains the pull tab **60** in the closed position. Further, in this position, the closing action of the hook **112** causes the locking prong **100** to project to its furthest possible extent into the central channel **40** where, in use, it will engage the interdigitated zip teeth with the result that, as a consequence of that engagement, the slider is locked against any motion relative to the zip teeth. When a user wishes to move the slider relative to the zip teeth, the user will grip the nib **66** and pivot the pull tab **60** into an upright position. When the pull tab **60** is in this position, the cam **64** acts on the follower surface **110** to push the hook **112** open a little. The consequence is then upward pivoting of the locking prong **100** which causes it to disengage from the knitted zip teeth, unlocking the slider from the zip and thereby permitting relative motion of the slider body and zip teeth.

Usually, when the pull tab **60** lies in the resting position, the locking prong **100** will project into the central channel and bear against the interdigitated zip teeth at a point in a ridge or valley created by the small space between two adjacent teeth. Occasionally, however, the locking prong may bear on top of a single zip tooth. When this happens, the prong does not project as far into the central channel **40** with the consequence that the hook **112** is stretched open a little (by comparison to the position when prong **110** is fully projected). This, in turn, prevents the follower surface **110** from applying as large a force to the cam **64**, resulting in a reduction in the resting bias retaining the pull tab **60** in the resting position with the nib **66** flat adjacent the upper body **10**. The pull tab may, consequently, then vibrate or wobble.

To ameliorate this outcome, a damping bias acts to urge the pull tab nib **66** away from the upper surface of the upper element **10** over a relatively small range of motion, thereby to stabilise the position of the pull tab, and most particularly to do so when the tab **60** is in the resting position and the locking prong bears against the top of a single zip tooth (so the resting bias is reduced). Equally, the small range of motion over which the damping bias acts ensures that the resting bias applied by cam **64** and follower surface **110** remains sufficient to retain the pull tab **60** in its resting position and yet, without the ability for it to vibrate or wobble.

Referring now to FIGS. **7** to **10**, in conjunction with, principally, FIGS. **2** to **4**, in the present embodiment the damping bias is provided by a spring which, in the present embodiment, is a leaf spring **200**. The leaf spring **200** has, when viewed in elevation, a U shape, which defines to U limbs **202** that extend around the bushes **70**; and, in side view, a V shape which defines V limbs. The spring **200** sits in a corresponding V shaped recess **72** in the upper surface of the upper element **10** and is retained in position in this recess by means the action of a pair of feet **68** on the pull tab **60** which project beyond the cross shaft **62**, in a direction distal to the nib **66**. The configuration of the feet **68** is flared at their ends. Viewed in side view, when the pull tab **60** is in the closed position, the feet **68** of the pull tab **60** bear against one of the V limbs **204** and the body of the pull tab **60** bears against the other V limb **204** to retain the spring **200** on the slider body. When in the upright, open position, the edges of the flared feet **68** of the pull tab **62** bear against two points close to and substantially equidistant from the apex **206** of the V limbs **204** and, once again, act to retain the spring **200** on the slider body.

Further, when the pull tab **60** is in the closed position, one of the V limbs **204** bears against the body of the pull tab **60** with a first damping force, to prevent it from contacting the slider body. The feet **68** of the pull tab **60**, however, also bear against the other V limb **204** with a second damping force and this, to some degree counteracts the rotational force (first damping force) applied on the nib **66** which acts to move it from the resting position. This configuration of the first and second damping forces therefore provides a damping bias which, over a small range of motion, opposes the resting bias. When the pull tab is stationary in the resting position, the damping bias and resting bias are in equilibrium. The damping bias does not, therefore, prevent the pull tab **60** from adopting the resting position. Rather, in the present embodiment, it serves firstly to alter the resting position so that the nib **66** is held a little out of contact with the upper body **10**, and secondly, when in the resting position, damps vibration of the pull tab **60** and thereby prevents the nib **66** from travelling so far that it contacts the slider body in the resting position; the result being that the slider then has a robust, vibration and wobble free location for the pull tab **60** in the resting position regardless of whether the locking prong bears against the knitted zip teeth at a location between two teeth or on top of a single tooth.

The invention claimed is:

1. A zip slider comprising a body movable along opposing pairs of zip teeth to cause inter and extradigitation of the zip teeth;

a pull tab pivotally mounted to the body and having a resting position in which it lies against the body and a pulling position in which it is pivoted from the resting position;

a resting bias acting upon the pull tab, and through a first range of pivoting motion of the pull tab, the resting bias acting to urge the pull tab into the resting position, the resting bias comprising a cam upon the pull tab and a biasing spring retained to the body, the biasing spring comprising a follower surface which bears against the cam, wherein the pull tab includes a shaft journalled for rotation relative to the body, thereby to provide pivotal mounting of the pull tab relative to the body and a nib distal to the shaft by which the pull tab can be gripped, and wherein the cam is located on the shaft;

a locking prong engaged with interdigitated teeth to prevent relative motion of the slider and teeth when the pull tab is in the resting position, and disengaged to permit the relative motion when in the pulling position; and

a damping bias comprising a damping spring acting to urge the pull tab relative to the body when in the resting position, wherein the damping spring acts between the body and the nib of the pull tab, thereby to urge the nib away from the body.

2. A zip slider according to claim **1** wherein the biasing spring has a locking prong and the cam and biasing spring are configured such that:

a). the action of the cam on the follower surface biases the pull tab into the resting position;

b). when the pull tab is in the resting position, the locking prong bears against the interdigitated teeth;

c) when the pull tab is in the pulling position, the action of the cam on the follower surface raises the locking prong above the teeth.

3. A zip slider according to claim **2** wherein, when the pull tab is in the resting position, the damping bias applies a resilient force to the pull tab against the action of the resting bias.

4. A zip slider according to claim **1** wherein the damping spring acts to apply a first damping force causing the nib to pivot away from the resting position.

5. A zip slider according to claim **4** wherein the pull tab further comprises a foot extending from the tab in the region of the shaft and distally from the nib and the damping spring additionally acts to apply a second damping force between the body and the foot to oppose pivoting of the nib away from the resting position.

6. A zip slider according to claim **5** wherein the damping bias is provided by the first and second damping forces.

7. A zip slider according to claim **6** wherein when the pull tab is stationary in the resting position, the damping bias and resting bias are in equilibrium.

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